CLAIMS

What is claimed is:

1. An electrochemical device component, comprising:

an active metal electrode having a first surface and a second surface;

a protective composite on the first surface of the electrode, the composite comprising,

a first material in contact with the electrode, the first material being ionically conductive and chemically compatible with the active metal; and

a second material in contact with the first material, the second material being substantially impervious, ionically conductive and chemically compatible with the first material;

wherein the ionic conductivity of the composite is at least 10^{-7} S/cm.

2. The component of claim 1, further comprising a current collector on the second surface of the active metal electrode.

3. The component of claim 1, wherein the second material comprises the sole electrolyte in a subsequently formed battery cell.

4. The component of claim 3, wherein the subsequently formed battery cell further comprises an electrolyte.

5. The component of claim 1, wherein the ionic conductivity of the second material is between about 10^{-6} S/cm and 10^{-3} S/cm.

6. The component of claim 1, wherein the ionic conductivity of the second material is between about 10^{-5} S/cm and 10^{-4} S/cm.

7. The component of claim 1, wherein the ratio of the first material to the second material in the composite is less than 1-1000.

8. The component of claim 1, wherein the active metal of the electrode is lithium or a lithium alloy.

9. The component of claim 1, wherein the first material comprises a material selected from the group consisting of active metal nitrides, active metal phosphides, and active metal halides, and active metal phosphorus oxynitride glass.

10. The component of claim 1, wherein the first material comprises a material selected from the group consisting of Li_3N, Li_3P and LiI, LiBr, LiCl, LiF, and LiPON.

11. The component of claim 1, wherein the second material comprises a material selected from the group consisting of glassy or amorphous metal ion conductors, ceramic active metal ion conductors, and glass-ceramic active metal ion conductors.

12. The component of claim 1, wherein the second material comprises a material selected from the group consisting of LiPON, $Li_3PO_4.Li_2S.SiS_2$, $Li_2S.GeS_2.Ga_2S_3$, LISICON, NASICON, sodium beta-alumina and lithium beta-alumina.

13. The component of claim 1, wherein the first material comprises a complex of an active metal halide and a polymer.

14. The component of claim 1, wherein the second material is an ion conductive glass-ceramic having the following composition:

Composition	mol %
P_2O_5	26-55%
SiO_2	0-15%
$GeO_2 + TiO_2$	25-50%
in which GeO_2	0--50%
TiO_2	0--50%
ZrO_2	0-10%
M_2O_3	0 < 10%
Al_2O_3	0-15%
Ga_2O_3	0-15%
Li_2O	3-25%

and containing a predominant crystalline phase composed of $Li_{1+x}(M,Al,Ga)_x(Ge_{1-y}Ti_y)_{2-x}(PO_4)_3$ where $X \leq 0.8$ and $0 \leq Y \leq 1.0$, and where M is an element selected from the group consisting of Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm and Yb and/or and $Li_{1+x+y}Q_xTi_{2-x}Si_yP_{3-y}O_{12}$ where $0< X \leq 0.4$ and $0< Y \leq 0.6$, and where Q is Al or Ga.

15. The component of claim 1, wherein the second material is a flexible membrane comprising particles of an ion conductive glass-ceramic having the following composition:

Composition	mol %
P_2O_5	26-55%
SiO_2	0-15%
$GeO_2 + TiO_2$	25-50%
in which GeO_2	0--50%
TiO_2	0--50%
ZrO_2	0-10%
M_2O_3	0 < 10%
Al_2O_3	0-15%
Ga_2O_3	0-15%
Li_2O	3-25%

and containing a predominant crystalline phase composed of $Li_{1+x}(M,Al,Ga)_x(Ge_{1-y}Ti_y)_{2-x}(PO_4)_3$ where $X \leq 0.8$ and $0 \leq Y \leq 1.0$, and where M is an element selected from the group consisting of Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm and Yb and/or and $Li_{1+x+y}Q_xTi_{2-x}Si_yP_{3-y}O_{12}$ where $0< X \leq 0.4$ and $0< Y \leq 0.6$, and where Q is Al or Ga in a solid polymer electrolyte.

16. The component of claim 1, wherein the protective composite is a laminate of discrete layers of the first material and the second material.

17. The component of claim 1, wherein the protective composite comprises a gradual transition between the first material and the second material .

18. A protective composite battery separator, comprising:

an ionically conductive first material or precursor that is chemically compatible with an active metal and air; and

a second material in contact with the first material, the second material being substantially impervious, ionically conductive and chemically compatible with the first material;

wherein the ionic conductivity of the composite is at least 10^{-7} S/cm.

19. A method of fabricating an electrochemical device component, the method comprising:

forming a composite of

a first material adjacent to the active metal anode that is ionically conductive and chemically compatible with an active metal, and

a second material adjacent to the first material that is substantially impervious, ionically conductive and chemically compatible with the first material,

wherein there is a gradual transition between the first material and the second material of the composite; and

applying an active metal anode material to the first material side of the composite;

wherein the ionic conductivity of the composite is at least 10^{-7} S/cm.

20. A battery cell, comprising:

an active metal negative electrode having a first surface and a second surface;

a protective composite on the first surface of the negative electrode, the composite comprising,

a first material in contact with the electrode that is ionically conductive and chemically compatible with the active metal; and

a second material in contact with the first material, the second material being, substantially impervious, ionically conductive and chemically compatible with the first material,

wherein the ionic conductivity of the composite is at least 10^{-7} S/cm;

optionally, an electrolyte; and

a positive electrode.